COMPARISON OF PRIMING MECHANISM OF ACTIVE PASSIVE BILATERAL THERAPY AND MIRROR THERAPY ON HAND FUNCTION IN POST – STROKE PATIENTS
A RANDOMIZED CONTROL STUDY

Dissertation submitted in

the Partial fulfilment

for the degree of

MASTER OF PHYSIOTHERAPY

(Neurology)

The Tamil Nadu DR. M.G.R. Medical University

Chennai

May 2019

PSG COLLEGE OF PHYSIOTHERAPY

Coimbatore

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CERTIFICATE

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Internal Examiner **External Examiner**

Date of Evaluation:

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PERIYASAMY ANGAMUTHU

ABBREVIATIONS

APBT	-	Active Passive Bilateral Therapy
MT	-	Mirror Therapy
AFMUE	-	Abbreviated Fugl Meyer Upper Extremity
ARAT	-	Action Research Arm Test

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CHAPTER I

INTRODUCTION

Stroke is a disease of the central nervous system caused by impaired blood supply to brain, and it disturb the normal function of motor system, perception, sensory, language and especially in activities of daily living. We need our upper limb for most of the activities but in case of stroke, upper limb movements are impaired. So our rehabilitation should be focused on upper limb recovery [1].

Most of our activities of daily living are accomplished by upper limb especially we need our upper limb to perform reaching in multi direction, grasping the different size and shape of the objects, releasing the objects and manipulative functions [2]. Special fine motor function like prehension and precision handling are done by our distal part of the upper limb. After stroke, all upper limb functional activities are impaired, and immediately paralysis or weakness occurs in the arm and hand, it leads to activity limitations or restriction in upper limb and it causes major impairment in performing all our upper limb hand functions [3].

Priming is defined as a change in behavior based on previous stimuli. Priming, which may occur after a single learning episode, is a type of implicit learning. The role of implicit learning in physical therapy has been the subject of recent investigation. The learning of this mechanism was different from other types of implicit learning because skill-learning requires repetition. It was originated in psychology, but still investigated in neuroscience, neurorehabilitation, and cognitive neuroscience using behavioral and brain mapping techniques. Both translational and clinical studies have been examining motor priming as a tool for inducing neuroplasticity and it also enhance the effects of rehabilitation. Priming can be categorized as a restorative intervention that reduces impairment. Priming stimuli can be from the same modality as the Modal-specific (accompanying task) or Cross-modal (from a different modality). Example for Modal-specific priming is bilateral mirror symmetrical movement (it is a movement-based priming) and it also increase the rate of motor learning in neurological condition. Cross-modal priming can also be used to enhance motor learning. Examples are semantic priming such as reading relevant words describing an action, can produce more efficient movements. Some positive results are seen in

cross modal priming. Many psychology literature results shows that same modality priming is effective than cross modal priming [4].

Active-passive bilateral priming is a pattern of coordinated movement it assist the paretic limb by disinhibits the motor cortex [5]. Using Active Passive Bilateral Therapy (APBT) for motor priming is noninvasive and it has no side effect. It relies upon a device which mechanically couples the two hands. In APBT the non-paretic wrist actively perform flexion and extension and that produces mirror symmetric movement of paretic wrist, that was caused due to linkage mechanism and it is the specific advantage of this device. There by it reduces short latency intracortical inhibition (SICI) within the passive motor cortex [6].

Mirror therapy is a type of intervention which uses the movement of sound side of the body, and this movements are reflected in a mirror, as visual feedback. These feedback promotes bilateral motor training and it also stimulates function of the brain [7]. Mirror therapy makes a visual imagination of patient and felt like two hands are moving simultaneously. This will activate the cerebral hemisphere and it forms the basis of neurological mechanism to brain plasticity. It promote the recovery of the upper limbs and enhance the motor patterns, agility, and manipulation skills of these limbs [8].

Action Research Arm Test (ARAT) is commonly used by physiotherapists in stroke Patients. It is used to measures the upper extremity of hand function [9]. It has four subscales such as grasp, grip, pinch and gross movements. It contains large or small object to strength upper extremity of the hand function. Grasp activity have 6 task, Grip activity have 4 task, Pinch activity have 6 task and Gross movements have 3 task. ARAT using 4 points; 0 = no movements, 1= perform the task partially, 2 = complete the task but take 5 to 60 sec, 3 = preform the task within 5 sec. Total score is 57. The patient position was seated in a firm chair and no arm rest. The head should be straight position and body should maintain upright posture and with the trunk contacting the back of the chair. During task period to prevent the patient from standing up, shifting laterally and leaning forward. The ARAT has proven to have strong validity when compared with other upper extremity functions scale. In a study comparing scores on the ARAT in stroke population with scores on others scales, results show good to moderate correlation, indicting a good predictive validity. The

ARAT has high responsiveness and the ability to detect clinically significant changes in the motor functioning of an individual's upper extremity, particularly in stroke recovery population [10].

The Fugl-Meyer (FM) assessment is a stroke - specific, performance - based impairment index. It is used to assess motor functioning, balance, sensation and joint functioning in patient [11]. Fugl-Meyer assessment is quantitative measures of motor impairment following stroke, in this assessment consist of Abbreviated Fugl Meyer Upper Extremity scale (AFMUE) [12]. This scale is used to check the reflex activities of biceps, triceps and finger flexors, and to check the movements in wrist and hand of coordination and speed activity. This scale was newly designed to measure the hand function ability of stroke patient. It is a 3 point scale; 0 = cannot perform, 1 = performs partially, 2 = performs fully [13].

1.1 NEED OF THE STUDY:

Based on the available evidence the studies suggest that priming mechanism of active passive bilateral therapy were effective in improving the hand function of post stroke patient. Mirror therapy were also effective in improving the hand function of post stroke patient. There are only a few studies that have investigated the effects of active passive bilateral therapy and mirror therapy combined with exercise on improving the hand function and activities of daily living in stroke patients. But there are no studies to compare the effect of these two therapies as priming techniques to improve hand function in post stroke patients.

1.2 OBJECTIVES:

To determine the effectiveness of Active Passive Bilateral Therapy as priming technique on hand function in post stroke patients.

To determine the effectiveness of Mirror Therapy as priming technique on hand function in post stroke patients.

To compare the effect of priming mechanism of Active Passive Bilateral Therapy and Mirror Therapy on hand function in post stroke patients.

1.3 HYPOTHESIS:

Null Hypothesis (H_o): There will be no significant difference between the effects of priming mechanism of Active Passive Bilateral Therapy and Mirror Therapy on hand function in post stroke patients.

Alternative Hypothesis (Ha): There will be significant difference between the effects of priming mechanism of Active Passive Bilateral Therapy and Mirror Therapy on hand function in post stroke patients.

1.4 OPERATIONAL DEFINITION:

ABBREVIATED FUGL MEYER UPPER EXTREMITY (AFMUE)

Fugl Meyer Assessment scale is an index to assess the sensorimotor motor impairments in individuals who have had stroke. Abbreviated Fugl Meyer Upper Extremity has been tested extensively, and it was found to have excellent psychometric properties. It is used to measure the impairments from proximal to distal and synergistic to isolated voluntary movement. It is considered to assess the body function according to international classification of functioning, disability and health.

CHAPTER II

LITERATURE REVIEW

Preeti Raghavan., (2015), conducted a study on upper limb motor impairment post stroke**,** understanding upper limb impairment after stroke is essential to planning therapeutic efforts to restore function. However determining which upper limb impairment to treat and how is complex for two reasons: 1) the impairments are not static, i.e. as motor recovery proceeds, the type and nature of the impairments may change; therefore the treatment needs to evolve to target the impairment contributing to dysfunction at a given point in time. 2) multiple impairments may be present simultaneously, i.e., a patient may present with weakness of the arm and hand immediately after a stroke, which may not have resolved when spasticity sets in a few weeks or months later; hence there may be a layering of impairments over time making it difficult to decide what to treat first. The most useful way to understand how impairments contribute to upper limb dysfunction may be to examine them from the perspective of their functional consequences. There are three main functional consequences of impairments on upper limb function are: (1) learned nonuse, (2) learned bad-use, and (3) forgetting as determined by behavioral analysis of tasks.

Mary Ellen Stoykov, et al., (2015) conducted a study on motor priming in neurorehabilitation study suggest that The challenge will be to determine which methods are most effective for various rehabilitation diagnoses and how those with various levels of impairment and disability differentially respond to the various method available for priming.

Mary Ellen Stoykov, et al., (2010) conducted an experimental study on active-passive bilateral therapy as a priming mechanism for individuals in the sub-acute phase of post-stroke Recovery: A feasibility study with 32 stroke patients to assess the feasibility of treating inpatient stroke survivors with active-passive bilateral therapy as a motor priming technique before occupational therapy. Both fugl-meyer upper extremity scores and action research arm test scores improved in this small group of test and control patients. The magnitude of improvement was greater in test patients who received active-passive bilateral therapy plus unilateral training and this study conclude that it is feasible and safe to administer active-passive bilateral therapy.

Cathy M. Stinear, et al., (2008) conducted a study on priming the motor system enhances the effects of upper limb therapy in chronic stroke with 3 groups (Control (n =16) APBT without cross-over (n=16) APBT with cross-over (n=21)) to improve hand function and result shows that APBT produced sustained improvements in upper limb motor function in chronic stroke patients and induced specific and sustained changes in motor cortex inhibitory function. We speculate that APBT may have facilitated plastic reorganization in the brain in response to motor therapy.

Jin-Young Park, et al., (2015) conducted a study on the effect of mirror therapy on upper-extremity function and activities of daily living in stroke Patients with two groups **(**Mirror group (n = 15) Control group (n = 15)**)** was conducted to compare abilities to perform activities of daily living. Results shows that paretic upper-extremity function and hand coordination abilities were significantly different between the mirror therapy and sham therapy groups. Intervention in the mirror therapy group was more effective than in the sham therapy group for improving the ability to perform activities of daily living. Self-care showed statistically significant differences between the two groups. This study concluded that mirror therapy is effective in improving paretic upper extremity function and activities of daily living in chronic stroke patients.

Kyunghoon Kim, et al., (2016) conducted a study on effects of mirror therapy combined with motor tasks on upper extremity function and activities daily living of stroke patients a mirror therapy group (n=12) and a conventional therapy group (n=13) measured by using action research arm test & fugl meyer assessment scale. Results shows that both groups showed significant differences between measurements taken before and after four weeks of therapy. In the intergroup comparison, the mirror therapy group showed significant improvements compared with the conventional therapy group, both in upper limb function and activities of daily living. This study concluded that mirror therapy is more effective than conventional therapy for the training of stroke patients to improve their upper limb function and activities of daily living.

Thomas Platz, et al., (2005) conducted a study on reliability and validity of arm function assessment with standardized guidelines for the fugl-meyer test, action research arm test and box and block test: a multicenter study. The result shows that all three motor tests showed very high inter-rater and test-retest reliability (ICC and rho for main variables > 0.95). Correlation between the motor scales was very high (rho > 0.92). Motor scales correlated moderately highly with the hemispheric stroke scale, a measure of impairment (rho = 0.660-0.689), but not with the modified barthel index, a measure of the ability to cope with basic activities of daily living (rho = 0.044-0.086). The study conclude that standardized guidelines assured comparability of test administration and scoring across clinical facilities. The arm motor scales provided information that was not identical to information from the hemispheric stroke scale or the modified barthel index.

Polykarpos Angelos Nomikos, et al., (2018) conducted a study on test-retest reliability of physiotherapists using the action research arm test in chronic stroke and to asses upper limb function activity convenience-snowball sample of 20 international physiotherapist (mean age and experience=32 ± 6.8 and 7.55 ± 7.4 years) used ARAT to score chronic stroke patient's upper limb function, observing a video at baseline and again ≈ 2 weeks later. The results shows that Spearman's rho was found ≈ 0.78 at a significance level of 0.00. ARAT was scored with a mean difference of 16.6 days and a mean change of 0.6 points was observed. Limits of agreement and coefficient of reproducibility were ± 2.3 and ± 2.6 respectively. The patient's arm impairment was categorized as moderate and floor or ceiling effects were not detected. The study concluded that ARAT is consistent, valid and should be used by physiotherapist in chronic stroke.

Johan Anton Franck, et al., (2017) conducted a study on changes in arm-hand function and arm-hand skill performance in patients after stroke during and after rehabilitation and to assess hand function by using fugl meyer test, action research arm test and grip strength and ABHILHAND. The Results shows that eighty-nine stroke patients (M/F: 63/23; mean age: 57.6yr (+/-10.6); post-stroke time: 29.8 days (+/-20.1) participated. All patients improved on arm hand function and arm-hand capacity during and after rehabilitation, except on grip strength in the severely affected subgroup. The study concluded that a majority of stroke patients across the whole arm-hand impairment severity spectrum significantly improved on arm hand function, arm-hand capacity

and self-perceived arm hand skill performance. These were maintained up to one year post-rehabilitation.

Elizabeth J Woytowicz, et al., (2017) conducted a study on determining levels of upper extremity movement impairment by applying cluster analysis to upper extremity fugl-meyer assessment in chronic stroke and to measure the quantitatively define levels of upper extremity movement impairment using cluster analysis of Fugl-Meyer upper extremity (FM-UE) with and without reflex items. The results shows that FM-UE scores ranged from 2–63 (mean=26.9±15.7) with reflex items and 0–57 (mean=22.1 ±15.3) without reflex items. Three clusters were identified. The distributions of the FM-UE scores revealed considerable overlap between the clusters, therefore four distinct stroke impairment levels were also derived. The study conclude that reflex items make no difference to the overall scores of the test, supporting previous recommendations for the exclusion of these items.

David J. Gladstone, et al., (2002) conducted a study on the Fugl-Meyer Assessment of motor recovery after stroke: A critical review of its measurement Properties. The study shows that there is good evidence from several validation studies that the Fugl-Meyer scale is indeed measuring what it is intended to measure. Significant correlations were found between the degree of motor impairment measured on the Fugl-Meyer motor scale and activities of daily living total score (0.75), hygiene (0.89), locomotion (0.76), feeding (0.72), and dressing (0.76). Total Fugl-Meyer scores correlated with total FIM (r = 0.63); Fugl-Meyer upper extremity motor scores correlated with functional independent measure self-care scores (r = 0.61); and lower extremity motor scores correlated with functional independent measure mobility scores (r = 0.74), $P < 0.0001$ for all.

CHAPTER III

MATERIALS AND METHODS

3.1 MATERIALS:

Block wood 10cm cube.

Block wood 7.5 cm cube.

Block wood 5 cm cube.

Block wood 2.5 cm cube.

Cricket ball 7.5 cm.

Stone 10×2.5×1 cm.

Glass.

Tube 2.25cm.

Tube 1×16 cm.

Washer 3.5 cm diameter.

Over bolt.

Ball bearing 6mm.

Marble 1.5 cm.

Knee hammer.

Mirror Box.

3.2 STUDY DESIGN:

Pre Test and Post Test Design with two comparison treatment.

3.3 STUDY SETTING:

Department of Neurology and Stroke Rehabilitation Centre, PSG Hospitals, Coimbatore.

3.4 HUMAN PARTICIPATION PROTECTION:

The study was reviewed and approved by Institutional Human Ethics Committee, PSG IMS&R.

3.5 POPULATION/PARTICIPANTS:

9 hemiparetic stroke patients.

3.6 SAMPLING:

Convenience Sampling Method

3.7 INTERVENTION:

GROUP A (n = 5) – Active Passive Bilateral Therapy and Training Activities.

15 repetition / 5 sets/ 60 minutes per day for 2 weeks.

GROUP B (n = 4) – Mirror Therapy and Training Activities.

15 repetition / 5 sets/ 60 minutes per day for 2 weeks.

3.8 CRITERIA FOR SAMPLE SELECTION

3.8.1 Inclusion Criteria:

- ✓ Age group of 40 to 65 yrs.
- ✓ Both male & female.
- ✓ First episode of ischemic stroke.
- ✓ Unilateral stroke with right or left hemiparesis.
- ✓ Medically stable patient.
- ✓ Able to follow verbal commands.

- ✓ Abbreviated Fugl Meyer for upper extremity (wrist, hand, co-ordination section) score between 3 to 25.

3.8.2 Exclusion Criteria:

- ✓ Musculoskeletal problem that affect the intervention.
- ✓ Severe upper extremity spasticity with modified ashworth scale of >2
- ✓ Severe sensory loss (score 2) as assessed with the National Institute of Health Stroke Scale (NIHSS).
- ✓ Visual impairments.

3.9 STUDY DURATION:-

Total duration of this study was 8 months.

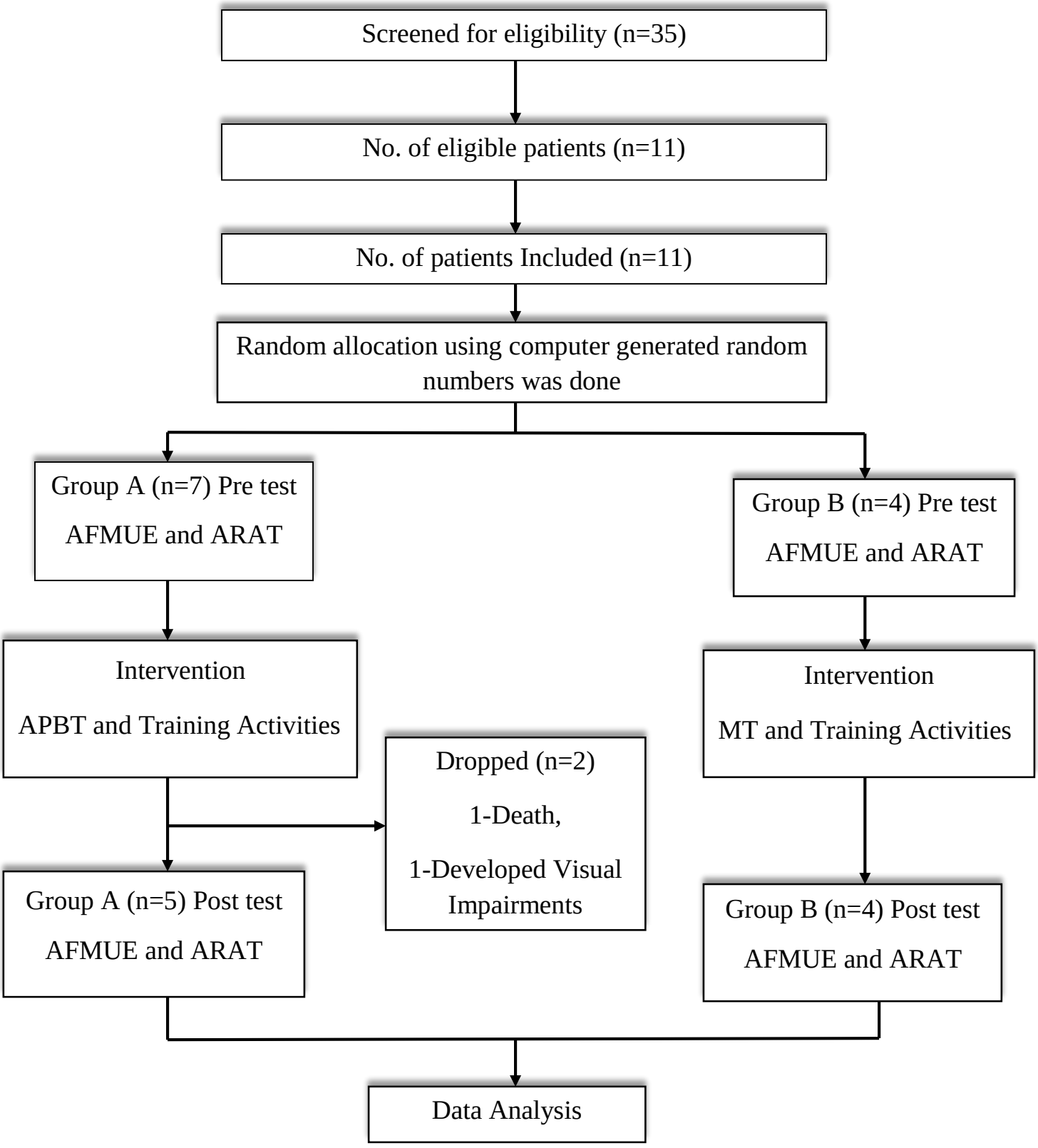
3.10 INSTRUMENT& TOOL FOR DATA COLLECTION:

- Action Research Arm Test.
- Abbreviated Fugl Meyer Upper Extremity Scale.

3.11 TECHNIQUE OF DATA COLLECTION:

Patient was assessed for eligibility based on inclusion & exclusion criteria. After obtaining the informed consent form, they were randomly allocated to Group A or B. Initial assessment (pre-test) was taken by using outcome measures. Then the intervention was given to each group separately for 2 weeks. Final assessment (post-test) was taken by using same outcome measures. Comparison of pre-test and post-test values within the group and between the groups was done finally.

SCHEMATIC REPRESENTATION OF FLOW OF PARTICIPANTS



3.12 TECHNIQUE OF DATA ANALYSIS & INTERPRETATION:

- Data collected from subjects were analyzed using paired‘t’ test to measure changes between pretest and posttest values of outcome measures within the group. Independent‘t’ test was used to measure the changes between the groups.

Paired‘t’ test

$$SD = \sqrt{\frac{\sum (d - \overline{d})^2}{n-1}}$$

$$t = \frac{\overline{d}\sqrt{n}}{SD}$$

$\overline{d}$ = Calculated Mean Difference of stroke and age matched healthy subject values

SD = Standard Deviation

n = Number of samples

d = Difference between stroke and age matched healthy subject values.

Independent‘t’ test

$$t = \frac{|\bar{x}_1 - \bar{x}_2|}{SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where,

$$SD = \sqrt{\frac{(n_1 - 1)SD_1^2 + (n_2 - 1)SD_2^2}{n_1 + n_2 - 2}}$$

X_1 = Mean difference in Group A

$\overline{X_2}$ = Mean difference in Group B

SD = Combined standard deviation of Group A and Group B

n_1 = Number of patients in Group A

n_2 = Number of patients in Group B

SD_1 = Standard Deviation of Group A

SD_2 = Standard Deviation of Group B

CHAPTER - IV

STATISTICAL ANALAYSIS AND INTERPRETATION

Data analysis is the systemic organization and synthesis of research data and testing of research hypothesis using these data. Interpretation is the process of making sense of the results of a study and examining the implication (Polit & Beck, 2004). The Pre-test and Post-test values for Groups A and Group B were obtained before and after intervention. The hand function activity was measured using Abbreviated Fugl Meyer Upper Extremity Scale [AFMUE] and Action Research Aram Test [ARAT]. The Mean, Standard deviation and Paired "t" test values were used to find out whether there was any significant difference between pre-test and post-test values within the groups. Statistical analysis for the present study was done using SPSS (version 21)

Independent "t" test is used to find the significant differences between the groups after intervention.

TABLE: 1

Pre and Post-test values of Abbreviated Fugl Meyer Upper Extremity (AFMUE) in Group A (n=5)

S No.	Pre test	Post test
1.	7	12
2.	10	17
3.	9	15
4.	12	19
5.	8	20

TABLE: 2

Pre and Post-test values of abbreviated Fugl Meyer Upper Extremity (AFMUE) in Group B (n=4)

S No.	Pre test	Post test
1.	8	14
2.	6	13
3.	12	19
4.	10	21

TABLE: 3

Mean, Standard Deviation and Paired‘t’ Test Values of AFMUE for Groups A & Group B

Groups	Mean	Standard Deviation	‘t’ Value	‘p’ Value
Group A				
Pre-test	9.20	1.92	6.12	P<0.001
Post-test	16.60	3.21		
Group B		2.58		
Pre-test	9.00		6.99	P<0.001
Post-test	16.75	3.86		

Based on Table 3, the mean value of Group A 9.20 in pre-test and 16.60 in post-test, Standard deviation was 1.92 in pre-test and 3.21 in post-test for Group A, the ‘t’ value using the paired ‘t’ test was 6.12 which was greater than the table value of 2.77 at P<0.001. In Group B the mean value was 9.0 in pre-test and 16.75 in post-test , standard deviation was 2.58 in pre-test and 3.86 in post-test for Group B, the ‘t’ value using the paired test was 6.99 which was greater than the table value of 3.182 at p<0.001. This shows there is a significant improvement in Abbreviated Fugl Meyer Upper Extremity in both groups. The result shows that pre-test and post-test mean difference of AFMUE for group A and group B have statistically significant difference.

GRAPH: 1

Pre and Post-test Mean values of AFMUE for Group A & Group B

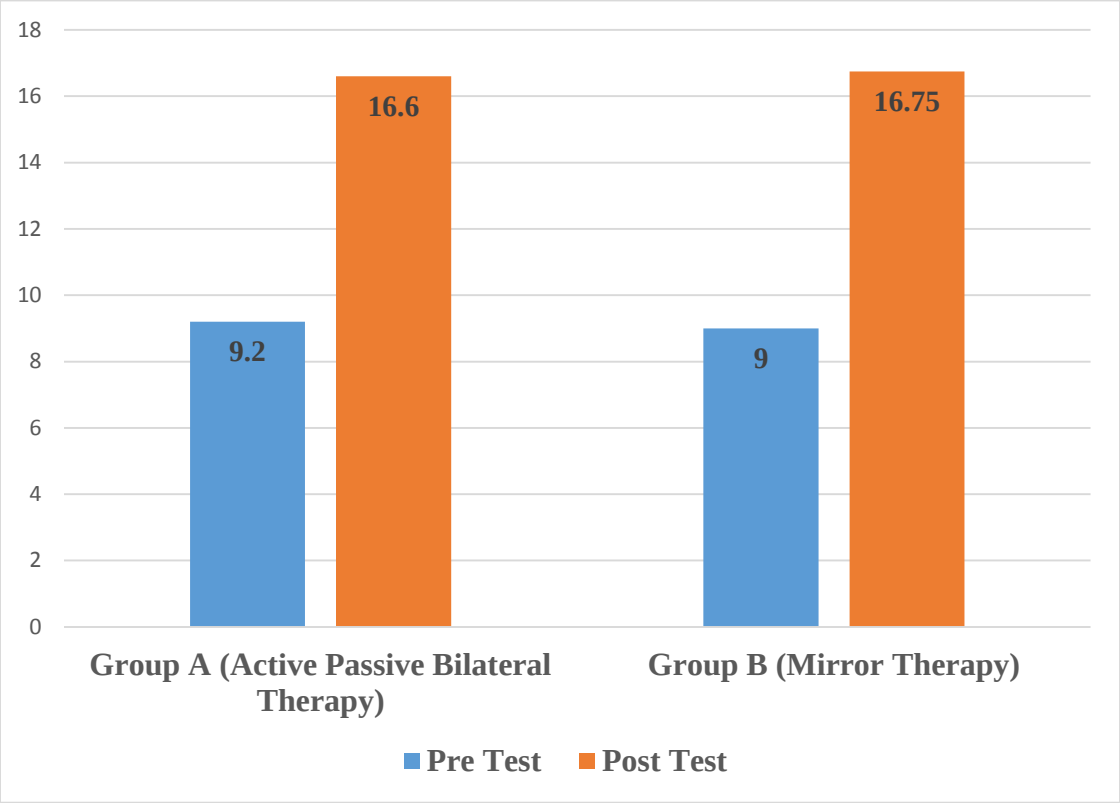


TABLE: 4

Pre and Post-test values of Action Research Arm Test (ARAT) in Group A (n=5)

S No.	Pre test	Post test
1	19	27
2	12	23
3	11	25
4	18	32
5	14	30

TABLE: 5

Pre and Post-test values of Action Research Arm Test (ARAT) in Group B (n=4)

S No.	Pre test	Post test
1.	16	34
2.	14	26
3.	11	23
4.	19	35

TABLE: 6

Mean, Standard Deviation and Paired‘t’ test values of ARAT for

Group A & Group B

Groups	Mean	Standard Deviation	‘t’ Value	‘p’ Value
Group A				
Pre-test	14.80	3.56	9.00	P<0.001
Post-test	27.40	3.65		
Group B				
Pre-test	15.00	3.37	9.66	P<0.001
Post-test	29.50	5.92		

Based on Table 6, the mean value of Group A was 14.80 in pre-test and 27.40 in post-test, Standard deviation was 3.56 in pre-test and 3.65 in post-test for Group A, the ‘t’ value using the paired ‘t’ test was 9.0 which was greater than the table value of 2.77 at P<0.001. In Group B the mean value was 15.00 in pre-test and 29.50 in post-test, standard deviation was 3.37 in pre-test and 5.92 in post-test for Group B, the ‘t’ value using the paired test was 9.66 which was greater than the table value of 3.18 at P<0.001. This shows there is a significant improvement in Action Research Arm Test in both groups. The result shows that pre-test and post-test mean difference of ARAT for Group A and Group B have statistically significant difference.

GRAPH: 2

Pre and Post-test Mean values of ARAT for Group A and Group B

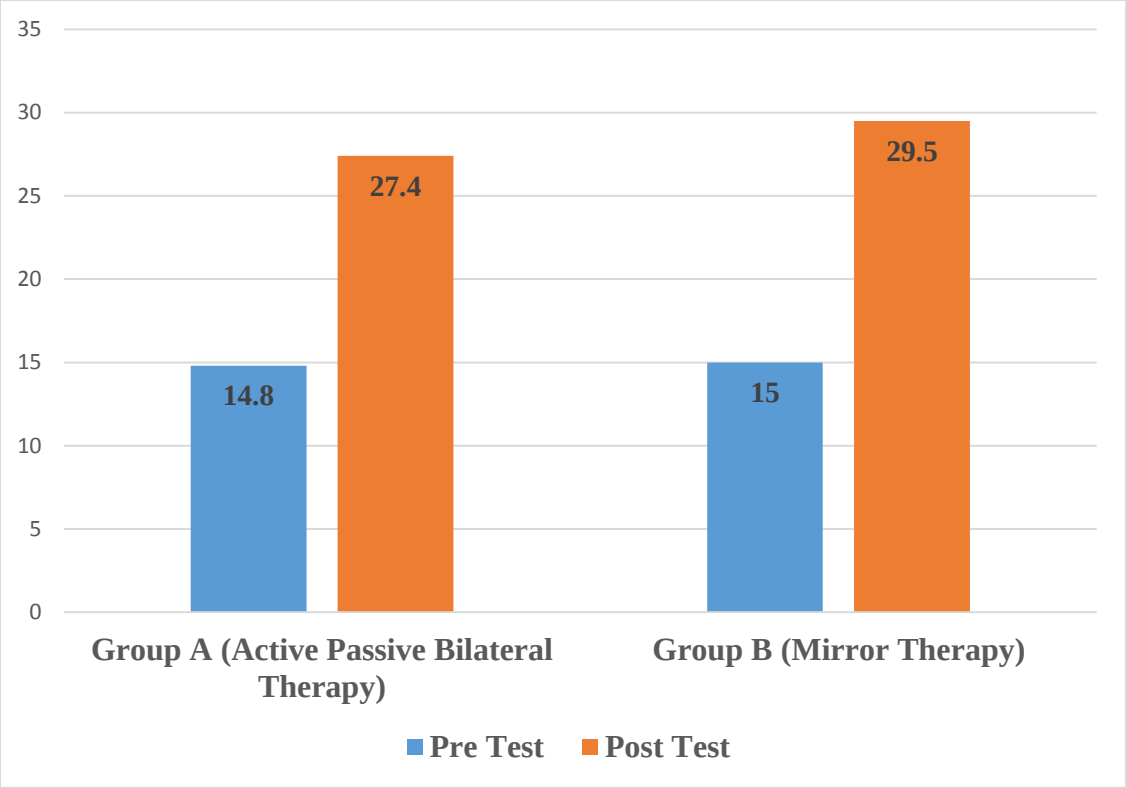


TABLE: 7

Comparison between the Post-test values of

Group A (Active Passive Bilateral Therapy) & Group B (Mirror Therapy)

Outcome Measures	Mean	Standard Deviation	"t" value	"p" value
AFMUE	Group A 16.60	Group A 3.21	0.063	0.9509
	Group B 16.75	Group B 3.86		
ARAT	Group A 27.4	Group A 3.65	0.658	0.5316
	Group B 29.5	Group B 5.92		

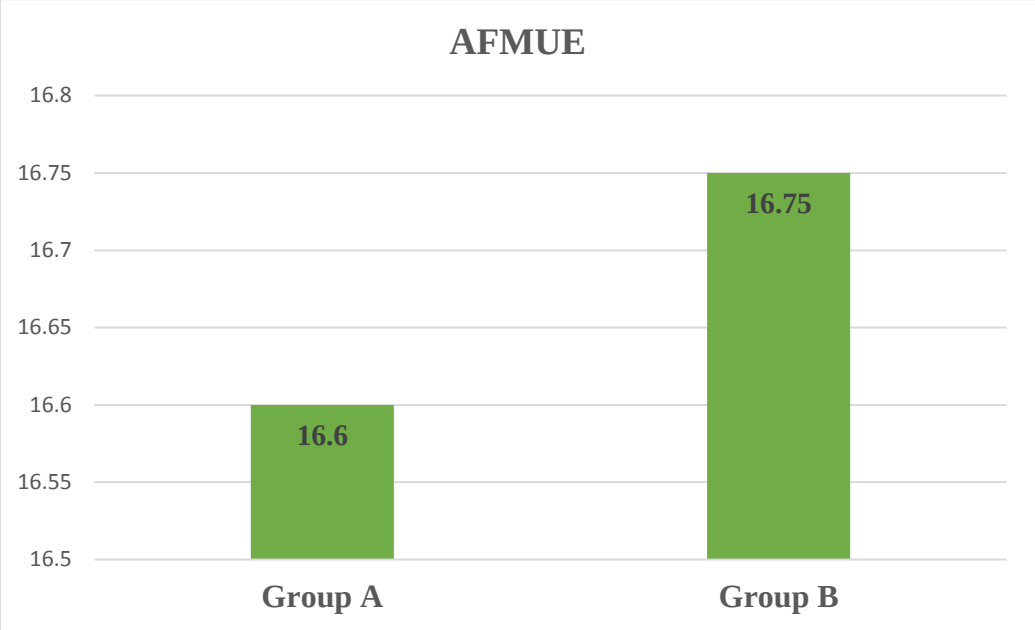
The Independent't' test was performed between Group A and Group B to analyse the significance between the APBT and Mirror Therapy with Exercises on improving hand function in post stroke patients. The Abbreviated Fugl Meyer Upper Extremity Scale between the groups were calculated using independent't' test & the 't' value was 0.063 which was lesser than the table value of 2.36 at p>0.001.

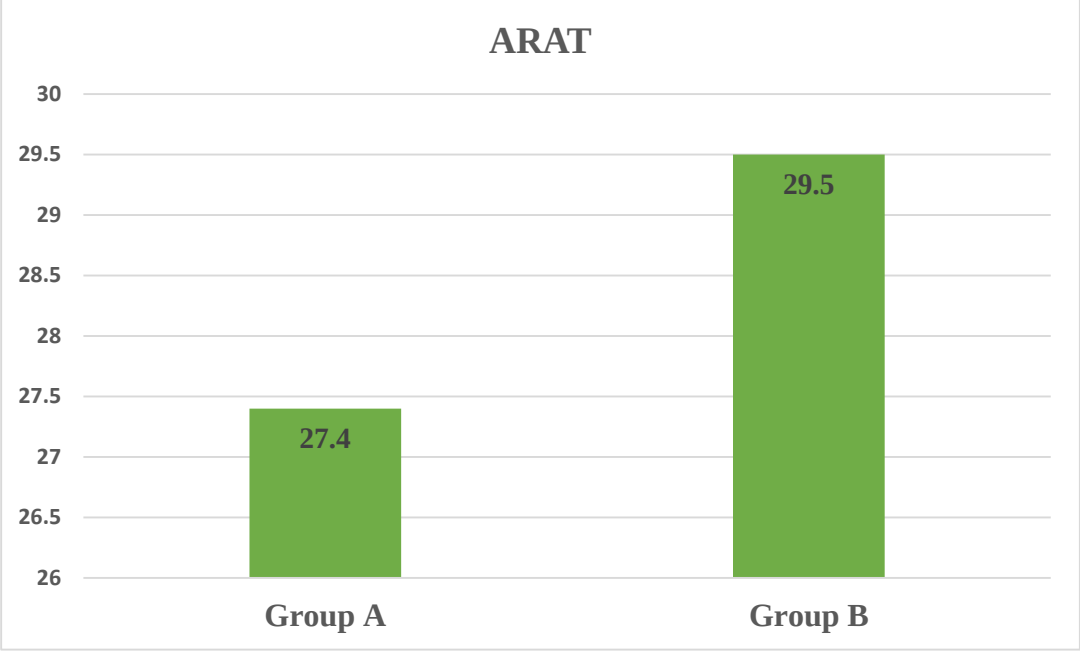
The Action Research Arm Test between the group were calculated using independent't' test & the obtained 't' value is 0.658 which was lesser than that of table value of 2.36 at p>0.001. Therefore the results of these statistical analyses showed that the Group A and Group B was same effective on AFMUE and ARAT and there is no significant difference in both groups.

GRAPH: 3

Comparison between the Post-test values of

Group A (Active Passive Bilateral Therapy) & Group B (Mirror Therapy)





CHAPTER V

RESULTS AND DISCUSSION

RESULT:

The data from Group A (APBT) and Group B (Mirror Therapy) for abbreviated fugl meyer upper extremity were analysed using paired‘t’ test and independent ‘t’ test. The calculated value of paired‘t’ test for group A (APBT) is 6.12 and for group B (Mirror Therapy) is 6.99 which is greater than the table value indicating there is a significant difference within both the group. The value of independent‘t’ test for both groups is 0.063 which is lesser than the table value indicating there is a no significant difference between the groups. Hence the null hypothesis is accepted, alternate hypothesis is neglected.

The data from Group A (APBT) and Group B (Mirror Therapy) for action research arm test were analysed using paired‘t’ test and independent‘t’ test. The calculated value of paired‘t’ test for Group A (APBT) is 9.00 and for Group B (Mirror Therapy) is 9.66 which is greater than the table value indicating there is a significant difference within both the group. The value of independent‘t’ test for both groups is 0.65 which is lesser than the table value indicating there is no significant difference between the groups. Hence the null hypothesis is accepted, alternate hypothesis is neglected.

The principle finding of the present study was that both Group A and Group B was significantly effective for improving hand function activities. When comparing the results of Group A and Group B there was no significant difference were noted. The study suggest that both intervention were equally effective in improving hand function.

DISCUSSION:

Even though the various studies of active passive bilateral therapy and mirror therapy have been shown to improve the hand function after a long term rehabilitation, to our knowledge evidence on short term i.e., for two week effect of along with exercises in relation to hand function is not clear. These leads a major route of idea in implenting in this study.

The aim of this study was to compare the effectiveness of Active Passive Bilateral Therapy and Mirror Therapy along with exercise in post stroke patients.

Nine number of hemiparesis post stroke participants from inpatient department of neurology and physical medicine and rehabilitation referred to stroke rehabilitation centre where recruited in this study.

The participants who satisfied the selection criteria were randomly assigned into two groups by convenient sampling. Baseline measurements were taken using the Abbreviated Fugl Meyer Upper Extremity Scale (AFMUE) and Action Research Arm Test (ARAT) for both groups. One group received active passive bilateral therapy along with exercise (APBT) and the other group received mirror therapy (MT) along with exercise for 2 weeks. At the end of 2 weeks, participants were again evaluated and measurements were taken using same outcome measures. Statistical analysis for the present study was done using SPSS (version 21). And the results were mentioned above.

Mary Ellen Stoykov, et al., 2010 suggested that compare the conventional group and the experimental group, priming mechanism of active passive bilateral therapy is an adjuvant therapy and useful to acute and sub-acute stroke patient. This device is not harmful to the patient. It also restore of balance in the neural mechanism. Fugl Meyer upper extremity scale results shows greater improvement in the hand function. Therefore experimental group of priming mechanism of active passive bilateral therapy is more effective than the conventional group.

Kyunghoon Kim, et al., 2016 suggested that compare the mirror therapy along with exercise and the conventional therapy were applied to the stroke patient. In mirror therapy neural mechanism of pre motor cortex area plays a major role motor recovery after brain damage. Functional Independent measure is used in the both group and result shows in mirror therapy. The results

shows that significant improvement in upper limb function and activities of daily living was more effective in the mirror therapy than the conventional therapy.

LIMITATION OF THE STUDY:

- There was no control group without intervention, so it is difficult to exclude effects of the natural recovery process of hand function.
- Within the study duration less number of patient meets the inclusion criteria, so we can't able to complete the sample size.

SUGGESTION OF THE STUDY:

- A Randomized Control Trails for large number of participant should be incorporate.
- Long term follow up can be done to determine the effect of intervention.
- Treatment session can be extended for furthermore better functional outcome.

CHAPTER VI

SUMMARY AND CONCLUSION

This study was conducted to compare the effect of priming mechanism of active passive bilateral therapy and mirror therapy on hand function in post stroke patients. Thus the statically analysis of data concluded that

There was significant improvement in hand function following active passive bilateral therapy in post stroke patient.

There was significant improvement in hand function following mirror therapy in post stroke patient.

Both active passive bilateral therapy group and mirror therapy group shows equally significant improvement on hand function.

This study concludes that for hand function rehabilitation of priming mechanism we can use either active passive bilateral therapy or mirror therapy or both for priming mechanism.

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PSG Institute of Medical Sciences & Research
Institutional Human Ethics Committee

Recognized by The Strategic Initiative for Developing Capacity in Ethical Review (SIDCER)
POST BOX NO. 1674, PEELAMEDU, COIMBATORE 641 004, TAMIL NADU, INDIA
Phone : 91 422 - 2598822, 2570170, Fax : 91 422 - 2594400, Email : ihec@psgimsr.ac.in

Ref. No.: PSG/IHEC/2018/Appr/FB/021

To
Mr Periyasamy A
I Year MPT
PSG College of Physiotherapy
Guide/s: Mr Mahesh R / Mr Raja Regan J / Dr Balakrishnan R
Coimbatore

Ref: Project No.18/118

Date: July 19, 2018

Dear Mr Periyasamy,

Institutional Human Ethics Committee, PSG IMS&R reviewed and discussed your application dated 14.04.2018 to conduct the research study entitled *"Comparison of priming mechanism of active passive bilateral therapy and mirror therapy on hand function in post stroke patients"* during the IHEC review meeting held on 18.05.2018.

The following documents were reviewed and approved:

1. Project Submission form
2. Study protocol (Version 2 dated 14.06.2018)
3. Informed consent forms (Version 2 dated 18.07.2018)
4. Data collection tool (Version 2 dated 12.07.2018)
5. Permission letter from concerned Head of Department
6. Current CVs of Principal investigator, Co-investigators
7. Budget

The following members of the Institutional Human Ethics Committee (IHEC) were present at the meeting held on 18.05.2018 at College Council Room, PSG IMS & R between 2.30 pm and 5.00 pm:

Sl. No.	Name of the Member of IHEC	Qualification	Area of Expertise	Gender	Affiliation to the Institution Yes/No	Present at the meeting Yes/No
1	Mrs Y Ashraf	MPT	Physiotherapy	Female	Yes	Yes
2	Dr. K. Bhuvaneswari	MD	Clinical Pharmacology	Female	Yes	Yes
3	Mr Gowpathy Velappan	BA., BL	Legal Advisor	Male	No	Yes
4	Dr A Jayavardhana	MD	Clinician (Paediatrics)	Male	Yes	Yes

SECRETARY PSG IMS&R COIMBATORE-641004 INSTITUTIONAL HUMAN ETHICS COMMITTEE

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5	Mr P Karuppuchamy	M Phil in PSW	Social Scientist	Male	Yes	Yes
6	Dr G Malarvizhi	M Sc, Ph D	Nursing	Female	Yes	No
7	Mr. R. Nandakumar (Chairperson, IHEC)	BA., BL	Legal Expert	Male	No	Yes
8	Dr. Parag K Shah	DNB	Clinician (Ophthalmology)	Male	No	Yes
9	Mrs P Rama	M Pharm	Non-Medical (Pharmacy)	Female	Yes	Yes
10	Dr. Seetha Panicker	MD	Clinician (Obstetrics & Gynaecology)	Female	Yes	Yes
11	Dr. S. Shanthakumari	MD	Pathology, Ethicist	Female	Yes	Yes
12	Dr G Subhashini	MD	Epidemiology	Female	Yes	Yes
13	Dr. Sudha Ramalingam (Alternate Member-Secretary, IHEC)	MD	Public Health, Epidemiology, Genetics, Ethicist	Female	Yes	Yes
14	Mrs. Swasthika Soundararaj	MBA	Lay person	Female	No	Yes
15	Dr. D. Vijaya (Member – Secretary)	M Sc, Ph D	Basic Medical Sciences (Biochemistry)	Female	Yes	Yes

The study is approved in its presented form. The decision was arrived at through consensus. Neither PI nor any of proposed study team members were present during the decision making of the IHEC. The IHEC functions in accordance with the ICH-GCP/ICMR/Schedule Y guidelines. The approval is valid until one year from the date of sanction. You may make a written request for renewal / extension of the validity, along with the submission of status report as decided by the IHEC.

Following points must be noted:

1. IHEC should be informed of the date of initiation of the study
2. Status report of the study should be submitted to the IHEC every 12 months
3. PI and other investigators should co-operate fully with IHEC, who will monitor the trial from time to time
4. At the time of PI's retirement/intention to leave the institute, study responsibility should be transferred to a colleague after obtaining clearance from HOD, Status report, including accounts details should be submitted to IHEC and extramural sponsors
5. In case of any new information or any SAE, which could affect any study, must be informed to IHEC and sponsors. The PI should report SAEs occurred for IHEC approved studies within 7 days of the occurrence of the SAE. If the SAE is 'Death', the IHEC Secretariat will receive the SAE reporting form within 24 hours of the occurrence
6. In the event of any protocol amendments, IHEC must be informed and the amendments should be highlighted in clear terms as follows:
    a. The exact alteration/amendment should be specified and indicated where the amendment occurred in the original project. (Page no. Clause no. etc.)
    b. Alteration in the budgetary status should be clearly indicated and the revised budget form

SECRETARY INSTITUTIONAL HUMAN ETHICS COMMITTEE PSG IMS&R COIMBATORE-641004

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should be submitted

c. If the amendments require a change in the consent form, the copy of revised Consent Form should be submitted to Ethics Committee for approval

d. If the amendment demands a re-look at the toxicity or side effects to patients, the same should be documented

e. If there are any amendments in the trial design, these must be incorporated in the protocol, and other study documents. These revised documents should be submitted for approval of the IHEC and only then can they be implemented

f. Any deviation-Violation/waiver in the protocol must be informed to the IHEC within the stipulated period for review

7. Final report along with summary of findings and presentations/publications if any on closure of the study should be submitted to IHEC

Thanking You,

Yours Sincerely,

19/7/18

SECRETARY
PSG IMS&R
COIMBATORE-641004.
INSTITUTIONAL HUMAN ETHICS COMMITTEE

Dr D Vijaya
Member - Secretary
Institutional Human Ethics Committee

ANNEXURE II

Neurological Physiotherapy Evaluation Form

I. Subjective Assessment **Researcher/Therapist by:**

Name: Age: Gender: M/F IP/OP

Occupation: Handedness: R/L Referred by:

Address:

Chief Complaints:

Past Medical History:

Personal History:

Family History:

Socioeconomic History:

Symptoms History:

Side: Site:

Onset: Duration:

Type: Severity:

Aggravating Factors:

Relieving Factors:

Vital Signs:

Temperature:		Heart Rate:	
Blood Pressure:		Respiratory Rate:	

II. Objective Examination

a) ON OBSERVATION:

Attitude of limbs:

Built:

Posture:

Gait:

Pattern of Movement:

Mode of Ventilation:

Type/ Pattern of Respiration:

Oedema:

Muscle Wasting:

Pressure Sores:

Deformity:

Wounds:

External Appliances:

b) ON PALPATION

Warmth:

Tenderness:

Tone:

Swelling:

c) ON EXAMINATION

HIGHER MENTAL FUNCTIONS

Level of Consciousness:

Orientation:

Person:

Place:

Time: Memory:

Immediate:

Recent:

Remote:

Verbal:

Visual:

Communication:

Cognition:

Fund of Knowledge:

Calculation:

Proverb Interpretation:

Attention:

Emotional Status:

Perception:

Body Scheme/ Body Imaging:

Agnosias/ Apraxias:

Special Senses:

Cranial Nerves:

Nerves	Comments	Nerves	Comments
I - Olfactory		VII - Facial	
II - Optic		VIII - VestibuloCochlear	
III - Oculomotor		IX - Glossopharyngeal	
IV - Trochlear		X - Vagus	
V - Trigeminal		XI - Accessory	
VI - Abducent		XII - Hypoglossal	

SENSORY SYSTEM:

Location	Upper Extremity		Lower Extremity		Trunk		Comments
Sensation	Rt.	Lt	Rt.	Lt.	Rt.	Lt.	
Superficial							
Pain							
Temperature							
Touch							
Pressure							
Deep							
Mov. Sense							
Pos. Sense							
Vibration							

Cortical							
Tactile Localization							
2 pt. discrimination							
Stereognosis							
Barognosis							
Graphesthesia							
Texture Recognition							
Double Simultaneous Stimulation							

MOTOR SYSTEM:

Muscle Girth:

Area	Rt.(cm.)	Lt.(cm.)
Arm		
Forearm		
Thigh		
Calf		

Voluntary Control:

Side	Rt.	Lt.
Upper Limb		
Lower Limb		

Range of Motion:

Joint	Side	Movement	Limitation	Limiting factor

Shoulder				
Elbow				
Forearm				
Wrist				
Hand & Fingers				
Hip				
Knee				

Ankle & foot				
Cervical Spine				
Thoracic Spine				
Lumbar Spine				

Limb Length

True		
Apparent		
Side	Rt.(cm.)	Lt.(cm.)

Muscle Tone:

Muscles	Rt.	Lt.
Shoulder		
Flexors		
Extensors		
Abductors		
Adductors		
External Rotators		
Internal Rotators		
Elbow		
Flexors		
Extensors		
Forearm		
Pronators		
Supinators		
Wrist		
Flexors		
Extensors		
Radial Deviators		
Ulnar Deviators		
Hand		
Intrinsics		
Extrinsics		

Muscles	Rt.	Lt.
Hip		
Flexors		
Extensors		
Abductors		
Adductors		
External Rotators		
Internal Rotators		
Knee		
Flexors		
Extensors		
Ankle		
Dorsiflexors		
Plantarflexors		
Foot		
Invertors		
Evertors		
Intrinsics		
Extrinsics		

Muscle Power:

Muscles	Rt.	Lt.
Shoulder		
Flexors		
Extensors		
Abductors		
Adductors		
External Rotators		
Internal Rotators		
Elbow		
Flexors		
Extensors		
Forearm		
Pronators		
Supinators		
Wrist		
Flexors		
Extensors		
Radial Deviators		
Ulnar Deviators		
Hand		
Intrinsics		
Extrinsics		
Trunk Flexors		

Muscles	Rt.	Lt.
Hip		
Flexors		
Extensors		
Abductors		
Adductors		
External Rotators		
Internal Rotators		
Knee		
Flexors		
Extensors		
Ankle		
Dorsiflexors		
Plantarflexors		
Foot		
Invertors		
Evertors		
Intrinsics		
Extrinsics		

Trunk Side Flexors		
Trunk Rotators		

Reflexes:

Trunk Extensors			
Tapping (Foot)			
Heel to knee			
Drawing a circle(Hand)			
Drawing a circle(Foot)			

	Reflex	Left	Right
Superficial	Abdominal		
	Plantar		
Deep	Biceps		
	Brachioradialis		
	Triceps		
	Knee		
	Ankle		

Pathological:

Coordination:

Non Equilibrium Tests	Rt.	Lt.
Finger to nose		
Finger opposition		
Mass Grasp		
Pronation/Supination		

Equilibrium tests	Grade
Standing: Normal Posture	
Standing: Normal Posture with vision occluded	
Standing: Feet together	

Rebound test		
Tapping (Hand)		

Walk: Sideways	
Walk: Backward	
Walk in a circle	
Walk on heels	
Walk on toes	

Standing on one foot	
Standing: Lateral trunk flexion	
Tandem walking	

Involuntary Movements:

Balance:

Sitting:

Standing:

Balance Reactions:

Posture:

Lying:

Sitting:

Standing:

Gait

Step Length:

Stride Length:

Base width:

Cadence:

Biomechanical Deviations:

Hand Functions:

Reaching:

Grasping:

Releasing:

Assisstive Devices:

III. Systems Review:

INTEGUMENTARY SYSTEM:

Skin Status:

Pressure Sores:

RESPIRATORY SYSTEM:

RS Status:

Secretions:

Pattern of breathing:

Chest wall/Thoracic spine deformity:

CARDIOVASCULAR SYSTEM

CVS Status:

Deep Vein Thrombosis:

MUSCULOSKELETAL SYSTEM

Contractures:

Subluxations:

Joint mobility:

Other pathology:

BLADDER & BOWEL FUNCTIONS

Incontinence:

GASTROINTESTINAL SYSTEM

Status:

AUTONOMIC SYSTEM

Vasomotor:

Pseudomotor:

Trophic Changes:

Postural Hypotension:

Reflex Sympathetic Dystrophy:

IV. Functional Assessment: (The Functional Independence Measure)

Evaluation 1: Selfcare

Item 1. Food

Item 2. Care of appearance

Item 3. Hygiene

Item 4. Dressing upper body

Item 5. Dressing lower body

Evaluation 2: Sphincter control

Item 6. Control of bladder

Item 7. Control of bowel movements

Evaluation 3: Mobility

Item 8. Bed, chair, wheel chair

Item 9. To go to the toilets

Item 10. Bath-tub, shower

Evaluation 4: Locomotion

Item 11. Go, wheel chair

Item 12. Staircases

Evaluation 5: Communication

Item 13. Auditive comprehension

Item 14. Verbal expression

Evaluation 6: Social adjustment/cooperation

Item 15. Capacity to interact and to socially communicate

Item 16. Resolution of the problems

Item 17. Memory

Investigation Findings:

Problem List:

Sl.	Impairment	Functional Limitation

Functional Diagnosis:

V. Management

Goals:

Short term:

Long term:

Treatment:

Therapist/Researcher

ANNEXURE III

FOLLOW UP CHART

Name: **D O A:**

Age: **OP NO:**

Gender: **IP NO:**

Occupation:

Address:

Handedness:

Specific Complaints:

VITAL SIGNS:

Blood Pressure: **Respiratory Rate:**

Temperature: **Heart Rate:**

OUTCOME MEASURE:

S.No	Outcome Measure	Scores	
		Pre Test	Post Test
1)	Abbreviated FM for upper extremity (Wrist, Hand, Co-ordination section)		
2)	Action Research Arm Test.		

Date: **Therapist's Signature**

Study Volunteer ID:
Study Volunteer Name:

ANNEXURE IV

PSG Institute of Medical Science and Research, Coimbatore
Institutional Human Ethics Committee
INFORMED CONSENT FORMAT FOR RESEARCH PROJECTS

I, **Mr. Periyasamy. A**, am carrying out a study on the topic: **Comparison of Priming Mechanism of Active Passive Bilateral Therapy and Mirror Therapy on Hand Function in Post Stroke Patient** as part of our research project being carried out under the aegis of the Department of: **Physiotherapy**.

My research guide is: **Mr. Mahesh. R MPT (Cardio Respiratory)**

The justification for this study is: Bilateral priming is a neuromodulatory technique that evolved from bilateral training, which can be used to balance excitability between the cortices before training on unilateral task. The Active Passive Bilateral Therapy & Mirror Therapy can be used as a priming technique to improve hand functions. Using Active Passive Bilateral Therapy can generate crossed facilitation between the non-paretic & paretic upper limb. Mirror therapy uses the motions of the unaffected side of the body, reflected in a mirror, as visual feedback. This visual feedback enables bilateral motor training and stimulates functional improvement of brain function. There are no studies to compare the effect of these two therapies as priming techniques to improve hand function in post stroke patients. Hence there is a need for this study.

The objectives of this study are:

1. To determine the effectiveness of Active Passive Bilateral Therapy as priming technique on hand function in post stroke patient.
2. To determine the effectiveness of Mirror Therapy as priming technique on hand function in post stroke patient.
3. To compare the effect of priming mechanism Active Passive Bilateral Therapy and Mirror Therapy on hand function in post stroke patient.

Sample size: **52**.
Participants are **Post Ischemic Stroke – Hemiparesis** Random Allocation of 26 Participant to Group A and 26 Participant to Group B.
Age group: **40 to 65** years
Location: **Department of Physical Medicine Rehabilitation and Department of Neurology, PSG Hospital, Coimbatore.**
Initial interview: 45 minutes.
Final interview: 45 minutes.
If **photograph** is taken, purpose: **Yes**, without revealing the identity of yours we want to publish it in the project book, conferences and journals.
Data collected will be stored for a period of **5** years. We **will not use** the data as part of another study.
Clinical examination: **Yes**
Blood sample collection: **Not Applicable** Specify
quantity of blood being drawn: ml.
No. of times it will be collected:
Whether blood sample collection is part of routine procedure or for research (study) purpose: 1. Routine procedure 2. Research purpose

Specify **purpose**, discomfort likely to be felt and side effects, if any:
Whether blood sample collected will be stored after study period: Yes / No**, NA it will be destroyed**

Whether blood sample collected will be sold: Yes / No , **NA**
Whether blood sample collected will be shared with persons from another institution: Yes / No**, NA**
Medication given, if any, duration, side effects, purpose, benefits:
Whether medication given is part of routine procedure: Yes / No, **NA** (If not, state reasons for giving this medication)
Whether alternatives are available for medication given: Yes / No, **NA** (If not, state reasons for giving this particular medication)

Benefits from this study:

- **To Imrove Hand Function Activities**
- **To Improve Activity Daily Living**

Risks involved by participating in this study: **No Risks Involved**

How the results will be used:

- **Peer-reviewed scientific journals**
- **Conference presentation**
- **Internal report**

If you are uncomfortable in answering any of our questions during the course of the interview / biological sample collection, **you have the right to withdraw from the interview / study at anytime.** You have the freedom to withdraw from the study at any point of time. Kindly be assured that your refusal to participate or withdrawal at any stage, if you so decide, will not result in any form of compromise or discrimination in the services offered nor would it attract any penalty. You will continue to have access to the regular services offered to a patient. You will **NOT** be paid any remuneration for the time you spend with us for this interview / study. The information provided by you will be kept in strict confidence. Under no circumstances shall we reveal the identity of the respondent or their families to anyone. The information that we collect shall be used for approved research purposes only. You will be informed about any significant new findings - including adverse events, if any, – whether directly related to you or to other participants of this study, developed during the course of this research which may relate to your willingness to continue participation.
Consent: The above information regarding the study, has been read by me/ read to me, and has been explained to me by the investigator/s. Having understood the same, I hereby give my consent to them to interview me. I am affixing my signature / left thumb impression to indicate my consent and willingness to participate in this study (i.e., willingly abide by the project requirements).

Signature / Left thumb impression of the Study Volunteer / Legal Representative:

Signature of the Interviewer with date: Witness:

Contact number of PI: **9788128210**

Contact number of Ethics Committee Office: 0422 4345818

பூ சா கோ மருத்துவக் கல்லூரி மற்றும் ஆராய்ச்சி நிறுவனம், கோவை

மனித நெறிமுறைக் குழு

ஒப்புதல் படிவம்.

தேதி:

அ. பெரியசாமி ஆகிய நான் பூ சா கோ மருத்துவக் கல்லூரியின் / மருத்துவ மனையின் **இயன்முறை மருத்துவ** துறையின் கீழ், **முதன்மை வழிமுறையான (PRIMING MECHANISM) செயலில் ஈடு படும் இருதரப்பு சிகிச்சை (ACTIVE PASSIVE BILATERAL THERAPY) மற்றும் கண்ணாடி சிகிச்சை (MIRROR THERAPY) பயன்படுத்தி பக்கவாத பாதிப்பினால் ஏற்படும் கை செயல்பாட்டை அதிகரித்தல்** என்ற தலைப்பில் ஓர் ஆய்வு மேற்கொள்ள உள்ளேன்.

எண் ஆய்வு வழிகாட்டியில் மாணவர்களுக்கு மட்டும்:

ஆய்வு மேற் கொள்வதன் அடிப்படை:

பக்கவாதத்தின் பாதிப்பினால் கைகளை அசைக்க முடியாத செயலை உருவாக்கிறது. இதனால் அன்றாட வாழ்வில் நடைமுறைச் சார்ந்த செயல்கள் குறைகிறது. இந்த ஆய்வின் மூலம் முதன்மை வழிமுறை செயலில் ஈடுபடும் இருதரப்பு சிகிச்சை மற்றும் கண்ணாடி சிகிச்சை பயன்படுத்தி கை செயல்பாட்டை அதிகரித்தல் மற்றும் அன்றாட செயல்திறனை அதிகரிக்க முயற்சிக்கப்படுகிறது.

ஆய்வின் நோக்கம்:

1) செயலில் ஈடுபடும் இருதரப்பு சிகிச்சை பயன்படுத்தி பக்கவாத பாதிப்பினால் கை செயல்பாடு மற்றும் அன்றாட செயல் திறனை அதிகரித்தல்.
2) கண்ணாடி சிகிச்சை பயன்படுத்திய பக்கவாத பாதிப்பினால் கை செயல்பாடு மற்றும் அன்றாட செயல் திறனை அதிகரித்தல்.
3) ஒப்பீட்டுத்திறன் மூலமாக முதன்மை வழிமுறை செயலில் ஈடுபடும் இருதரப்பு சிகிச்சை மற்றும் கண்ணாடி சிகிச்சையை பயன்படுத்தி பக்கவாத பாதிப்பினால் கை செயல்பாடு மற்றும் அன்றாட செயல்திறனை அதிகரித்தல்.

ஆய்வில் பங்குபெறும் நபர்களின் எண்ணிக்கை = 52 கணினியின் ராண்டம் எண்களின் மூலமாக 26 நபர்கள் A குழுவிற்கும் மற்றும் 26 நபர்கள் B குழுவிற்கும் பயன்படுத்தப்படும்.

ஆய்வில் பங்குபெறுவோர் மற்றும் வயது: 40 - 65 வயதுள்ளவர்கள்.

ஆய்வு மேற்கொள்ளும் இடம்: உடல் மருத்துவம் மற்றும் மறுவாழ்வு துறை பூ சா கோ மருத்துவமனை, கோயமுத்தூர்.

இந்த ஆய்வின் எங்களுடன் ஒத்துழைக்குமாறு கேட்டுக் கொள்கிறோம். நாங்கள் சில தகவல்களை இந்த ஆய்விற்காக சேகரிக்க உள்ளோம்.

ஆய்வு செய்யப்படும் முறை:

இந்த ஆய்வின் மொத்த கால அளவு 10 மாதங்கள், இந்த ஆய்வில் பக்கவாதத்தினால் பாதிக்கப்பட்டு கைகளை அசைக்க முடியாத நிலையில் உள்ளார் 26 நபர்களை கொண்டு இருக்குழுவாக பிரித்துக் கொள்வோம்.

முதல் மற்றும் இரண்டாம் உரையின்போது பக்கவாதத்தினால் கைகளை அசைக்க முடியாத செயல்திறனை அளவிடும் **Abbrevated Fugl Meyer Upper Extremity (FMUE)** மற்றும் **Action Research Arm Test (ARAT)** என்ற படிவத்தை கொண்டு அளவீடுகள் குறிக்கப்படும்.

ஆய்வில் ஈடுபடும் முதல் குழுவிற்கு செயலில் ஈடுபடும் இருதரப்பு சிகிச்சை **(ACTIVE PASSIVE BILATERAL THERAPY)** மற்றும் பயிற்சிகளும் இரண்டாம் குழுவிற்கு கண்ணாடி சிகிச்சை **(MIRROR THERAPY)** மற்றும் பயிற்சிகள் இணைந்து கொடுக்கப்படும்.

இச்சிகிச்சை தொடர்ந்து ஒரு வாரத்திற்கு **5** முறை வீதமாக இரண்டு வாரங்களுக்கு அளிக்கப்படும். இரண்டாவது வார இறுதியில் மீண்டும் **(FUME** மற்றும் **ARAT)** அளவீடுகள் அளிக்கப்படும். பின்பு அதனை முதலில் எடுத்த அளவீடுகளுடன் ஒப்பிட்டு கை செய்யபாடு ஆராயப்படும்.

முதன்மை நேர்காணல்: 60 நிமிடங்கள்.

இந்த ஆய்வில் கிடைக்கும் தகவல்களை **5** வருடங்கள் பாதுகாக்கப்படும். இந்த தகவல்கள் வேறு ஆய்வுக்குப் பயன்படுத்தப் பட மாட்டாது.

சுகாதாரக் கல்வி: அமர்வுகள்: **2** முறை ஒரு அமர்வுக்கான நேரம்: **45** நிமிடங்கள்.

மருத்துவ பரிசோதனைகள்: உண்டு

இரத்த மாதிரி சேகரிப்பு: இல்லை

இரத்த மாதிரி எடுப்பது வழக்கமான சிகிச்சைக்காகவா அல்லது இந்த ஆய்விற்காகவா? பொருந்தாது

இதனால் ஏற்படக்கூடிய அசௌகரியங்கள் / பக்க விளைவுகள்: இதனால் எந்த அசௌகரியங்கள் பக்க விளைவுகளோ ஏற்பாடாது.

இரத்த மாதிரிகள் ஆய்வுக்கு பின் பாதுகாத்து வைக்கப்படுமா? ஆம் / இல்லை, அளிக்கப்படும். **பொருந்தாது.**

சேகரிக்கப்பட்ட இரத்தம் விற்கப்படுமா? : ஆம் / இல்லை. **பொருந்தாது.**

சேகரிக்கப்பட்ட இரத்தம் வேறு நிறுவனத்துடன் பகிர்ந்து கொள்ளப்படுமா?: ஆம் / இல்லை. **பொருந்தாது.**

மருந்துகள் ஏதேனும் கொடுக்கப்படவிருந்தால் அவை பற்றிய விவரம் (கொடுக்கப்படும் காரணம், காலம், பக்க விளைவுகள், பயன்கள்) **பொருந்தாது**

மருந்துகள் கொடுக்கப்படுவது வழக்கமான சிகிச்சை முறையா?: ஆம் /இல்லை (இல்லை என்றால் கொடுக்கப்படும் காரணம்) **பொருந்தாது**

கொடுக்கப்படும் மருந்துகளுக்கு மாற்று உள்ளதா? : ஆம் / இல்லை (ஆம் என்றால் இந்த குறிப்பிட்ட மருந்து கொடுக்கப்படும் காரணம்) **பொருந்தாது**

ஆய்வில் பங்கு பெருவதால் ஏற்படும் பலன்கள்:

இந்த ஆய்வில் பங்கு பெறுவதால், கை செயல்பாட்டை அதிகரித்து, அன்றாட செயல் திறனும் அதிகரிக்கும் என்று எதிர்பார்க்கப்படுகிறது.

ஆய்வில் பங்கேற்பதால் ஏற்படும் அசௌகரியங்கள் / பக்க விளைவுகள்:

இந்த ஆய்வினால் தங்களுக்கு எந்த விதமான அபாயங்களும் அசௌகரியங்களும் ஏற்படாது.

ஆய்வின் முடிவுகள் எந்த முறையில் பயன்படுத்தப் படும்?

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்கள் தங்களின் புகைப்படத்துடன் தங்களின் அடையாளம் அறியா வண்ணம் அகநிலை அறிக்கை **(Internal Report),** கலந்தாய்வுகள் **(Conference)**, அறிவியல் சார்ந்த ஆராய்ச்சி பத்திரிகையில் **(Journals)** வெளியிடப்படும். இதற்கு தங்களின் அனுமதி கோருகிறேன்.

இந்த ஆய்வின் கேள்விகளுக்கு பதிலளிப்பதிலோ, இரத்த மாதிரிகள் அல்லது திசு மாதிரிகள் எடுப்பதிலோ உங்களக்கு ஏதேனும் அசௌகரியங்கள் இருந்தால், எந்த நேரத்தில் வேண்டுமானாலும் ஆய்விலிருந்து விலகிக் கொள்ளும் உரிமை உங்களுக்கு உண்டு. எப்பொழுது வேண்டுமானாலும் ஆய்விலிருந்து விலகும் உரிமை உங்களுக்கு உள்ளது. ஆய்விலிருந்து விலகிக் கொள்வதால் உங்களுக்கு அளிக்கப்படும் சிகிச்சை முறையில் எந்த வித பாதிப்பும் இருக்காது என்று உங்களுக்கு உறுதியளிக்கிறோம். மருத்துவ மனையில் நோயாளிகளுக்கு அளிக்கப்படும் சேவைகள் நீங்கள் தொடர்ந்து பெறலாம். இந்த ஆய்வில் பங்கேற்க ஒப்புக்கொள்வதால் வேறு எந்த விதமான கூடுதல் பலனும் உங்களுக்குக் கிடைக்காது. நீங்கள் அளிக்கும் தகவல்கள் இரகசியமாக வைக்கப்படும். ஆய்வில் பங்கேற்பவர்கள் பற்றியோ அவர்கள் குடும்பத்தை பற்றிய எந்தத் தகவலும் எக்காரணம் கொண்டு வெளியிடப்படாது என்று உறுதியளிக்கிறோம். நீங்கள் அளிக்கும்

தகவல்கள்/ இரத்த மாதிரிகள்/ திசு மாதிரிகள் அங்கிகரிக்கப்பட்ட ஆய்விற்கு மட்டுமே பயன்படுத்தப் படும். இந்த ஆய்வு நடைபெறும் காலத்தில் குறிப்பிட்டத்தகுந்த புதிய கண்டுபிடிப்புகள் அல்லது பக்கவிளைவுகள் ஏதும் ஏற்பட்டால் உங்களுக்கு தெரிவிக்கப்படும். இதனால் ஆய்வில் தொடர்ந்து பங்கு பெறுவது பற்றிய உங்கள் நிலைப்பாட்டை நீங்கள் தெரிவிக்க ஏதுவாகும்.

ஆய்வுக்குட்படுபவரின் ஒப்புதல்: இந்த ஆய்வைப் பற்றிய மேற்கூறிய தகவல்களை நான் படித்து அறிந்து கொண்டேன் / ஆய்வாளர் படிக்கக் கேட்டுத் தெரிந்து கொண்டேன். ஆய்வினை பற்றி நன்றாகப் புரிந்து கொண்டு இந்த ஆய்வில் பங்கு பெற ஒப்புக்கொள்கிறேன். இந்த ஆய்வில் பங்கேற்பதற்கான எனது ஒப்புதலை கீழே கையப்பமிட்டு / கை ரேகை பதித்து நான் தெரிவித்துக் கொள்கிறேன்.

பங்கேற்பாளரின் பெயர், முகவரி:

பங்கேற்பாளரின் கையொப்பம் / கை ரேகை / சட்டப்பூர்வ பிரநிதியின் கையொப்பம்:

தேதி:

ஆய்வாளரின் கையொப்பம்:

தேதி:

ஆய்வாளரின் தொலைபேசி எண்: 9788128210

மனித நெறிமுறை குழு அலுவலகத்தின் தொலைப்பேசி எண்: 0422 4345818.

ANNEXURE V

Fugl-Meyer Assessment of Physical Performance

Area	Test	Scorig Criteria	Max Score	Attained Score
	Normal Reflex Activity biceps and/or finger flexors and triceps	This stage, which can render the score of two, is included only if the patient has a score of 6 in stage V.) **0** - At least 2 of the 3 phasic reflexes are markedly hyperactive. **1** - One reflex markedly hyperactive or at least 2 reflexes are lively. **2 -** No more than one reflex is lively and none are hyperactive.	2	
Wrist	**A.** Stability, elbow at 90°, shoulder at 0° **B.** Flexion/extension, elbow at 90°, shoulder at 0° **C.** Stability, elbow at 0°, shoulder at 30° **D.** Flexion/extension, elbow at 0°, shoulder at 30° **E.** Circumduction	**A.** **1-** Dorsiflexion is accomplished, but no resistance is taken. **2 -** Position can be maintained with some (slight) resistance. **B.** **0 -** Volitional movement does not occur. **1** - Patient cannot actively move the wrist joint throughout the total ROM. **2** - Faultless, smooth movement. **C.** Scoring is the same as for item a. **D.** Scoring is the same as for item b. **E.** **0 -** Cannot be performed. **1 -** Jerky motion or incomplete circumduction. **2 -** Complete motion with smoothness.	10	

Hand	**A.**Finger Mass Flexion **B.** Finger Mass Extension **C.** **Grasp 1** - MP joints extended and PIPS & DIPS are flexed. Grasp is tested against resistance. **D.** **Grasp 2** - Patient is instructed to adduct thumb, 1st carpometacarpophalangeal and interphalangeal joint at 0° **E.** **Grasp 3** - Patient opposes the thumb pad against the pad of index finger. A pencil is interposed. **F.** **Grasp 4** - The patient should grasp a cylinder shaped object (small can), the volar surface of the 1st and 2nd finger against each other **G.** **Grasp 5** - A spherical grasp.	**A. 0** - No flexion occurs. **1** - Some flexion, but not full motion. **2** - Complete active flexion (compared with unaffected hand). **B.** **0** - No extension occurs. **1** - Patient can release an active mass flexion grasp. **2** - Full active extension. **C.** **0** - Required position cannot be acquired. **1** - Grasp is weak. **2** - Grasp can be maintained against relatively great resistance. **D. 0** - Function cannot be performed. **1** - Scrap of paper interposed between the thumb and index finger can be kept in place, but not against a slight tug. **2** - Paper is held firmly against a tug. **E.** Scoring procedures are the same as for Grasp 2. **F.** Scoring procedures are the same as for Grasp 2 and 3. **G.**Scoring procedures are the same as for Grasp 2, 3, and 4.	14	
Hand	Coordination/Speed –Finger to nose (five repetitions inrapid succession). **A.**Tremor **B.** Dysmetria **C.** Speed	**A. 0** - Marked tremor. **1** - Slight tremor. **2** - No tremor. **B. 0** - Pronounced or unsystematic dysmetria. **1** - Slight or systematic dysmetria. **2** - No dysmetria. **C. 0** - Activity is more than 6 seconds longer than unaffected hand. **1** - 2 to 5 seconds longer than unaffected hand. **2** - Less than 2 seconds difference.	6	
		Total Score		

Pre Test Score ____ **Post Test Score ____**

ACTION RESEARCH ARM TEST

Patient Name: _____

Date: _____

Instructions

There are four subtests: Grasp, Grip, Pinch, Gross Movement. Items in each are ordered so that:

- if the subject passes the first, no more need to be administered and he scores top marks for that subtest;
- if the subject fails the first *and* fails the second, he scores zero, and again no more tests need to be performed in that subtest;
- otherwise he needs to complete all tasks within the subtest

Activity	**Score**
Grasp	
1. Block, wood, 10 cm cube (If score = 3, total = 18 and to Grip) Pick up a 10 cm block	_____
2. Block, wood, 2.5 cm cube (If score = 0, total = 0 and go to Grip) Pick up 2.5 cm block	_____
3. Block, wood, 5 cm cube	_____
4. Block, wood, 7.5 cm cube	_____
5. Ball (Cricket), 7.5 cm diameter	_____
6. Stone 10 x 2.5 x 1 cm	_____
Coefficient of reproducibility = 0.98	
Coefficient of scalability = 0.94	
Grip	
1. Pour water from glass to glass (If score = 3, total = 12, and go to Pinch)	_____
2. Tube 2.25 cm (If score = 0, total = 0 and go to Pinch)	_____
3. Tube 1 x 16 cm	_____
4. Washer (3.5 cm diameter) over bolt	_____
Coefficient of reproducibility = 0.99	
Coefficient of scalability = 0.98	
Pinch	
1. Ball bearing, 6 mm, 3rd finger and thumb (If score = 3, total = 18 and go to Grossmt)	_____

2. Marble, 1.5 cm, index finger and thumb (If score = 0, total = 0 and go to Grossmt) _____

3. Ball bearing 2nd finger and thumb _____

4. Ball bearing 1st finger and thumb _____

5. Marble 3rd finger and thumb _____

6. Marble 2nd finger and thumb _____

Coefficient of reproducibility = 0.99

Coefficient of scalability = 0.98

Grossmt (Gross Movement)

1. Place hand behind head (If score = 3, total = 9 and finish) _____
2. (If score = 0, total = 0 and finish _____
3. Place hand on top of head _____
4. Hand to mouth _____

Coefficient of reproducibility = 0.98

Coefficient of scalability = 0.97

Pre Test _____

Post Test _____

ANNEXURE VI

TREATMENT PROTOCOL

GROUP A – Active Passive Bilateral Therapy and Training Activities.

15 repetition / 5 sets/ 60 minutes per day for 2 weeks.

After giving active passive bilateral therapy, for each treatment day, the therapist selected two to four activities from each category.

Exercise based on 2 category:

CATEGORY 1: consisted of exercises or tasks that were designed to improve joint stability, mobility, and strength as well as the transport phase of reaching.

CATEGORY 2: consisted of activities and exercises that would support grasp and release.

For each treatment day, there is selection two to four activities from each category.

Category I (choose 2 to 4 of the following activities)

1. Work on shoulder elbow in supine (place and hold, active assisted, reach to target).

2. Practice elbow extension in sitting with the hand of the affected arm fixed on the mat.

3. Work on placing hand from lap to table without shoulder elevation and increasing distance of hand placement.

4. Active Assist shoulder and elbow coupling while the arm is supported on table (shoulder flexion, elbow extension). Therapist can provide assistance as needed.

5. Work in sitting/side lying/supine or prone on concentric and eccentric shoulder flexion (begin with place and hold and progress to stop and hold).

6. Throw beanbag toward feet after retrieving it from opposite shoulder.

7. Work on moving and coordinating the arm and hand to a target (vary the distance of the target).

Wrist:

1. Wrist extension/flexion gravity eliminated**.**

2. Wrist extension gravity assisted**.**

3. Place and hold in wrist extension/flexion**.**

4. Isotonic wrist extension/flexion with graded resistance**.**

5. PNF D1 or D2 pattern with distal focus (active or active-assist)**.**

6. Pushing a ball on surface with wrist and fingers positioned in extension**.**

7. Active/Active Assist radial abduction and adduction of wrist**.**

8. Place and hold from forearm neutral to various degrees of supination/pronation**.**

9. Isotonic supination and pronation with isometric holds at end ranges.

Finger Exercises (Weight of fingers can be supported by therapist):

1. Gross finger flexion and extension exercises**.**

2. Individual finger flexion and extension exercises (may include blocking exercises)**.**

3. Isometric holds for finger extension**.**

4. Finger abduction/adduction**.**

5. Exercises for thumb in all planes.

Category II (choose 2 to 4 of the following activities)

1. Strengthen weak grasp by pulling a rolled towel through the hand in radial direction and asking the subject to squeeze and then release.

2. Practice holding forearm in neutral position while supported by table.

3. Practice holding object that is placed in hand by therapist while arm is supported by table (can use any type of grasp or pinch).

4. Practice moving the arm with object placed in hand with arm supported on table (with and without vision).

5. Practice holding an object placed in hand by the therapist while moving the arm in space (not supported by table).

6. Hold a jar with affected hand and unscrew lid with unaffected one.
7. Strengthen thumb in radial abduction to increase stability.

8. Subject holds object and moves thumb up and down object surface while maintaining grasp.

9. Subject holds small pill bottle in hand and uses thumb to lift lid while maintaining grasp.
10. Grasp object on table that is supported by therapist (therapist is holding/stabilizing the object).

11. Grasp beanbag on table.

12. Practice holding 1or 2 lb weight in hand and then lowering it onto mat or floor and releasing.

13. After grasping rolled towel, relax finger flexors. Therapist can position towel in the air so that subject's arm is slightly raised. Use gravity.

14. Practice holding ball with two hands and then letting go.

15. Pass object from one hand to another.

GROUP B (n = 4) – Mirror Therapy and Training Activities.

15 repetition / 5 sets/ 60 minutes per day for 2 weeks.

After giving mirror therapy, for each treatment day, the therapist selected two to four activities from each category.

Exercise based on 2 category:

CATEGORY 1: consisted of exercises or tasks that were designed to improve joint stability, mobility, and strength as well as the transport phase of reaching.

CATEGORY 2: consisted of activities and exercises that would support grasp and release.

For each treatment day, there is selection two to four activities from each category.

Category I (choose 2 to 4 of the following activities)

1. Work on shoulder elbow in supine (place and hold, active assisted, reach to target).

2. Practice elbow extension in sitting with the hand of the affected arm fixed on the mat.

3. Work on placing hand from lap to table without shoulder elevation and increasing distance of hand placement.

4. Active Assist shoulder and elbow coupling while the arm is supported on table (shoulder flexion, elbow extension). Therapist can provide assistance as needed.

5. Work in sitting/side lying/supine or prone on concentric and eccentric shoulder flexion (begin with place and hold and progress to stop and hold).

6. Throw beanbag toward feet after retrieving it from opposite shoulder.

7. Work on moving and coordinating the arm and hand to a target (vary the distance of the target).

Wrist:

1. Wrist extension/flexion gravity eliminated**.**

2. Wrist extension gravity assisted**.**

3. Place and hold in wrist extension/flexion**.**

4. Isotonic wrist extension/flexion with graded resistance**.**

5. PNF D1 or D2 pattern with distal focus (active or active-assist)**.**

6. Pushing a ball on surface with wrist and fingers positioned in extension**.**

7. Active/Active Assist radial abduction and adduction of wrist**.**

8. Place and hold from forearm neutral to various degrees of supination/pronation**.**

9. Isotonic supination and pronation with isometric holds at end ranges.

Finger Exercises (Weight of fingers can be supported by therapist):

1. Gross finger flexion and extension exercises**.**
2. Individual finger flexion and extension exercises (may include blocking exercises)**.**

3. Isometric holds for finger extension**.**

4. Finger abduction/adduction**.**

5. Exercises for thumb in all planes.

Category II (choose 2 to 4 of the following activities)

1. Strengthen weak grasp by pulling a rolled towel through the hand in radial direction and asking the subject to squeeze and then release.

2. Practice holding forearm in neutral position while supported by table.

3. Practice holding object that is placed in hand by therapist while arm is supported by table (can use any type of grasp or pinch).

4. Practice moving the arm with object placed in hand with arm supported on table (with and without vision).

5. Practice holding an object placed in hand by the therapist while moving the arm in space (not supported by table).

6. Hold a jar with affected hand and unscrew lid with unaffected one.

7. Strengthen thumb in radial abduction to increase stability.

8. Subject holds object and moves thumb up and down object surface while maintaining grasp.

9. Subject holds small pill bottle in hand and uses thumb to lift lid while maintaining grasp.

10. Grasp object on table that is supported by therapist (therapist is holding/stabilizing the object).

11. Grasp beanbag on table.

12. Practice holding 1or 2 lb weight in hand and then lowering it onto mat or floor and releasing.

13. After grasping rolled towel, relax finger flexors. Therapist can position towel in the air so that subject's arm is slightly raised. Use gravity.

14. Practice holding ball with two hands and then letting go.
15. Pass object from one hand to another.

ABSTRACT

COMPARISON OF PRIMING MECHANISM OF ACTIVE PASSIVE BILATERAL THERAPY AND MIRROR THERAPY ON HAND FUNCTION IN POST - STROKE PATIENTS

BACKGROUND: Bilateral priming is a neuromodulatory technique that evolved from bilateral training, which can be used to balance excitability between the cortices before training on unilateral task. The Active Passive Bilateral Therapy & Mirror Therapy can be used as a priming technique to improve hand functions. Using Active Passive Bilateral Therapy can generate crossed facilitation between the non-paretic & paretic upper limb. Mirror therapy uses the motions of the unaffected side of the body, reflected in a mirror, as visual feedback. This visual feedback enables bilateral motor training and stimulates functional improvement of brain function. There are no studies to compare the effect of these two therapies as priming techniques to improve hand function in post stroke patients. Hence there is a need for this study.

OBJECTIVE: To compare the effect of priming mechanism Active Passive Bilateral Therapy and Mirror Therapy on hand function in post stroke patients.

DESIGN: Pre Test and Post Test Design with two comparison treatment

PARTICIPANT:

9 hemiparetic stroke patient, Department of Neurology and Stroke Rehabilitation center, PSG hospitals.

INTERVENTION:

GROUP A (n = 5) – Active Passive Bilateral Therapy and Training Activities.
15 repetition / 5 sets/ 60 minutes per day for 2 weeks.

GROUP B (n = 4) – Mirror Therapy and Training Activities.
15 repetition / 5 sets/ 60 minutes per day for 2 weeks.

RESULTS: All participant in Group A and Group B showed significant improvement in AFMUE with a mean value of 16.6 and 16.75 respectively. The calculated‘t’ value using paired‘t’ test for Group A and Group B were 6.12 and 6.99 ($P<0.001$) respectively. In ARAT, Group A and Group B showed significant improvement with a mean value of 27.4 and 29.5 ($P<0.001$) respectively. When comparing between the group using independent‘t’ test, the AFMUE showed‘t’ value of 0.063 ($P>0.05$), ARAT showed‘t’ value of 0.5316 ($P>0.05$).

CONCLUSION: This study was conducted to compare the effect of priming mechanism of active passive bilateral therapy and mirror therapy shows equally improvement on hand function in post stroke patients.

KEY WORD: Active Passive Bilateral Therapy, Mirror Therapy, Hand Function.

ACTIVE PASSIVE BILATERAL THERAPY

MIRROR THERAPY